WHAT IS CLAIMED IS:

1. A high-fluidity 1-butene-based polymer satisfying the following requirements (1), (2) and (3):

(1) an intrinsic viscosity [η] of 0.01 to 0.5 dL/g as measured in a tetralin solvent at 135°C;

(2) a crystalline resin having a melting point (Tm -D) of 0 to 100°C, the melting point being defined as a top of a peak observed on a highest-temperature side in a melting endothermic curve obtained by a differential scanning calorimeter (DSC) when a sample is held in a nitrogen atmosphere at -10°C for 5 min and then heated at a temperature rise rate of 10°C/min; and

(3) a stereoregularity index {(mmmm)/(mmrr + rmmr)} of 30 or lower.

2. A high-fluidity 1-butene-based polymer satisfying the following requirements (1), (2) and (3'):

(1) an intrinsic viscosity [η] of 0.25 to 0.5 dL/g as measured in a tetralin solvent at 135°C;

(2) a crystalline resin having a melting point (Tm -D) of 0 to 100°C, the melting point being defined as a top of a peak observed on a highest-temperature side in a melting endothermic curve obtained by a differential scanning calorimeter (DSC) when a sample is held in a nitrogen atmosphere at -10°C for 5 min and then heated at a temperature rise rate of 10°C/min; and

(3') a mesopentad fraction (mmmm) of 68 to 73% as determined from a nuclear magnetic resonance (NMR) spectrum.

3. The high-fluidity 1-butene-based polymer according to claim 2, wherein said polymer has a zero-shear viscosity η^0 of 300 Pa·s or lower and a tensile elongation at break of 100% or more.

4. The high-fluidity 1-butene-based polymer according to claim 1 or 2, wherein said polymer further satisfies the following requirements (4) and (5):

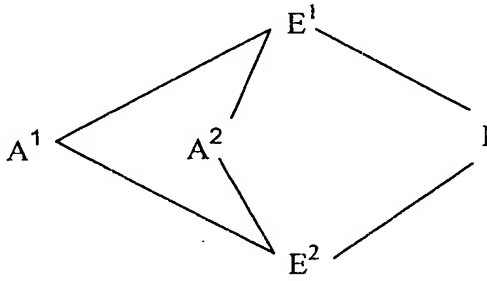
(4) a molecular weight distribution (Mw/Mn) of 4 or lower as measured by gel permeation chromatography (GPC); and

(5) a weight-average molecular weigh(Mw) of 10,000 to 100,000 as measured by GPC.

5. A process for producing a high-fluidity 1-butene-based polymer, comprising:

homopolymerizing 1-butene, or copolymerizing 1-butene with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene, in the presence of a polymerization catalyst comprising:

(A) a transition metal compound represented by the following general formula (I):



------- (I)

wherein M is a metal element belonging to Groups 3 to 10 or lanthanoid of the Period Table;

E^1 and E^2 are independently a ligand selected from the group consisting of substituted cyclopentadienyl, indenyl, substituted indenyl, heterocyclopentadienyl, substituted heterocyclopentadienyl, amide group, phosphide group, hydrocarbon groups and silicon-containing groups, which form a cross-linked structure via A^1 and A^2 and may be same or different from each other;

X is a ligand capable of forming a σ-bond with the proviso that when a plurality of X groups are present, these X groups may be same or different from each other, and may be cross-linked with the other X group, E^1, E^2 or Y;

Y is a Lewis base with the proviso that when a plurality of Y groups are present, these Y groups may be same or different from each other, and may be cross-linked with the other Y group, E^1, E^2 or X;

A^1 and A^2 are divalent cross-linking groups capable of bonding the two ligands E^1 and E^2 to each other which may be same or different from each other, and are independently a C_1 to C_{20} hydrocarbon group, a C_1 to C_{20} halogen-containing hydrocarbon group, a silicon-containing group, a germanium-containing group, a tin-containing group, -O-, -CO-, -S-, $-SO_2-$, -Se-, $-NR^1-$, $-PR^1-$, $-P(O)R^1-$, $-BR^1-$ or $-AlR^1-$ wherein R^1 is a hydrogen atom, a halogen atom, a C_1 to C_{20} hydrocarbon group or a C_1 to C_{20} halogen-containing hydrocarbon group;

q is an integer of 1 to 5 given by the formula: [(valence of M) - 2]; and

r is an integer of 0 to 3, and

(B) at least one component selected from the group consisting of (B-1) a compound capable of forming an ionic complex by reacting with said transition metal compound (A), and (B-2) aluminoxane.

6. The process according to claim 5, wherein 1-butene is homopolymerized in the presence of the polymerization catalyst containing an organoboron compound as the component (B).

7. The process according to claim 5, wherein 1-butene is copolymerized with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene in the presence of the polymerization catalyst containing an organoboron compound as the component (B).

8. A process for producing the high-fluidity 1-butene-based polymer as claimed in claim 1 or 2, comprising:

homopolymerizing 1-butene, or copolymerizing 1-butene with ethylene and/or a C_3 to C_{20} α-olefin except for 1-butene, in the presence of a polymerization catalyst comprising:

(A) a transition metal compound represented by the above general formula (I) and (B) at least one component selected from the group consisting of (B-1) a compound capable of forming an ionic complex by reacting with said

transition metal compound (A), and (B-2) aluminoxane.

9. The process according to claim 8, wherein the component (B) is an organoboron compound.

10. A high-fluidity 1-butene-based polymer produced by the process as claimed in claim 6 or 7.

11. A 1-butene-based resin modifier comprising the high-fluidity 1-butene-based polymer as claimed in claim 1.

12. A hot-melt adhesive containing the high-fluidity 1-butene-based polymer as claimed in claim 2.